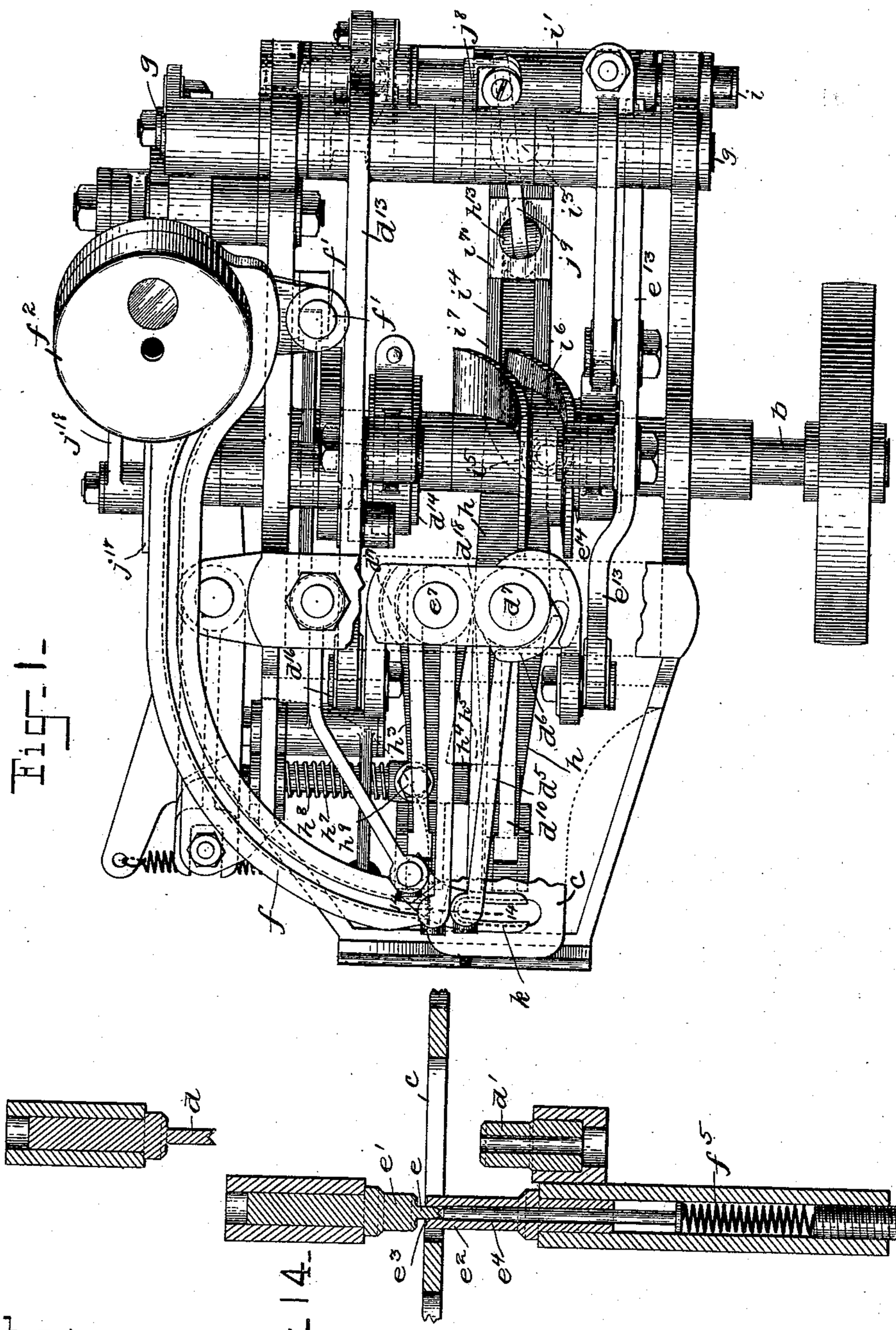
(No Model.)

6 Sheets—Sheet 1.

E. WOODWARD & C. HATCH, Jr.

EYELETING MACHINE.

No. 501,754. Patented July 18, 1893.



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(No Model.) 6 Sheets—Sheet 2.

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EYELETING MACHINE.

No. 501,754. Patented July 18, 1893.

Fig. 2.

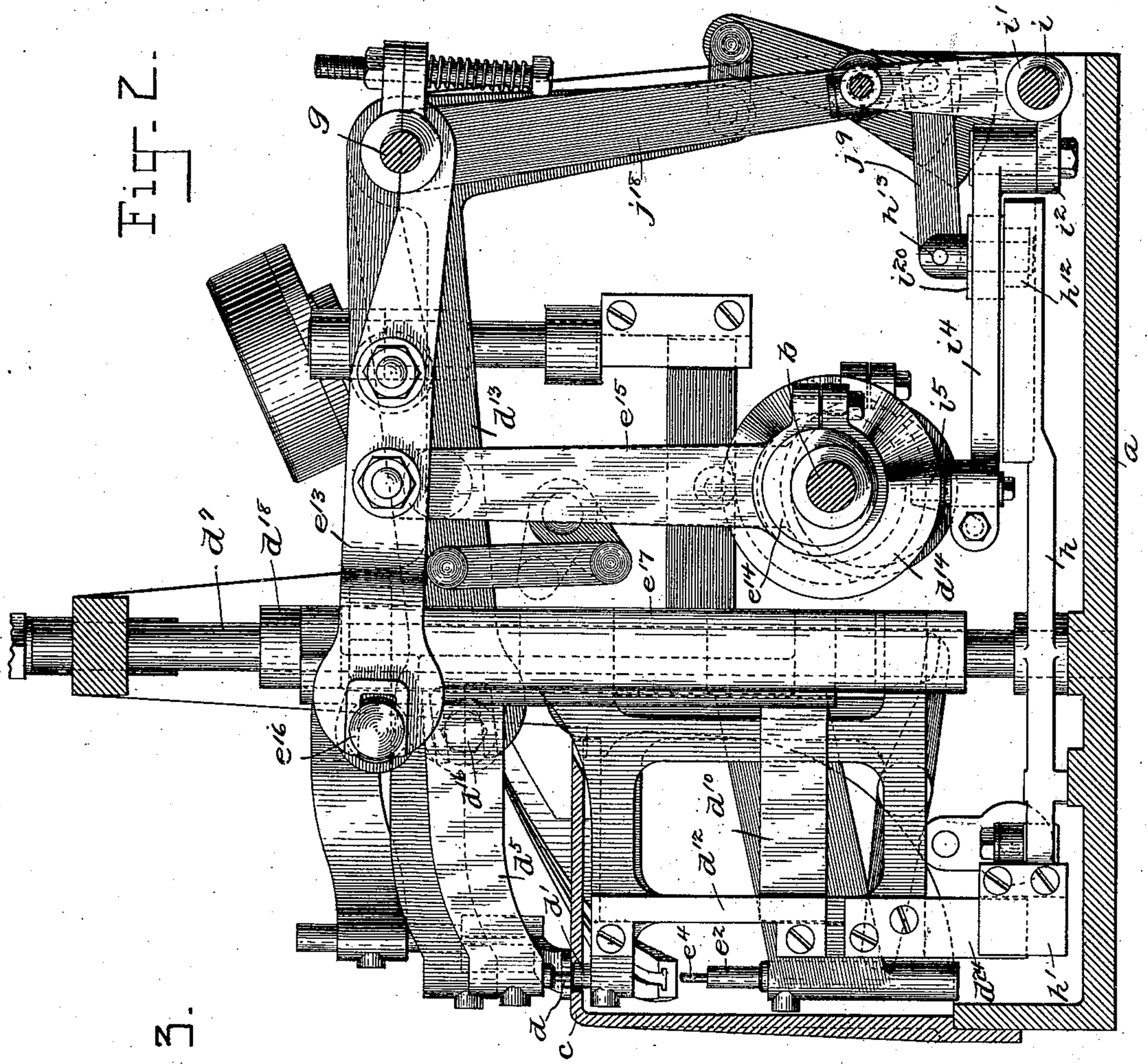
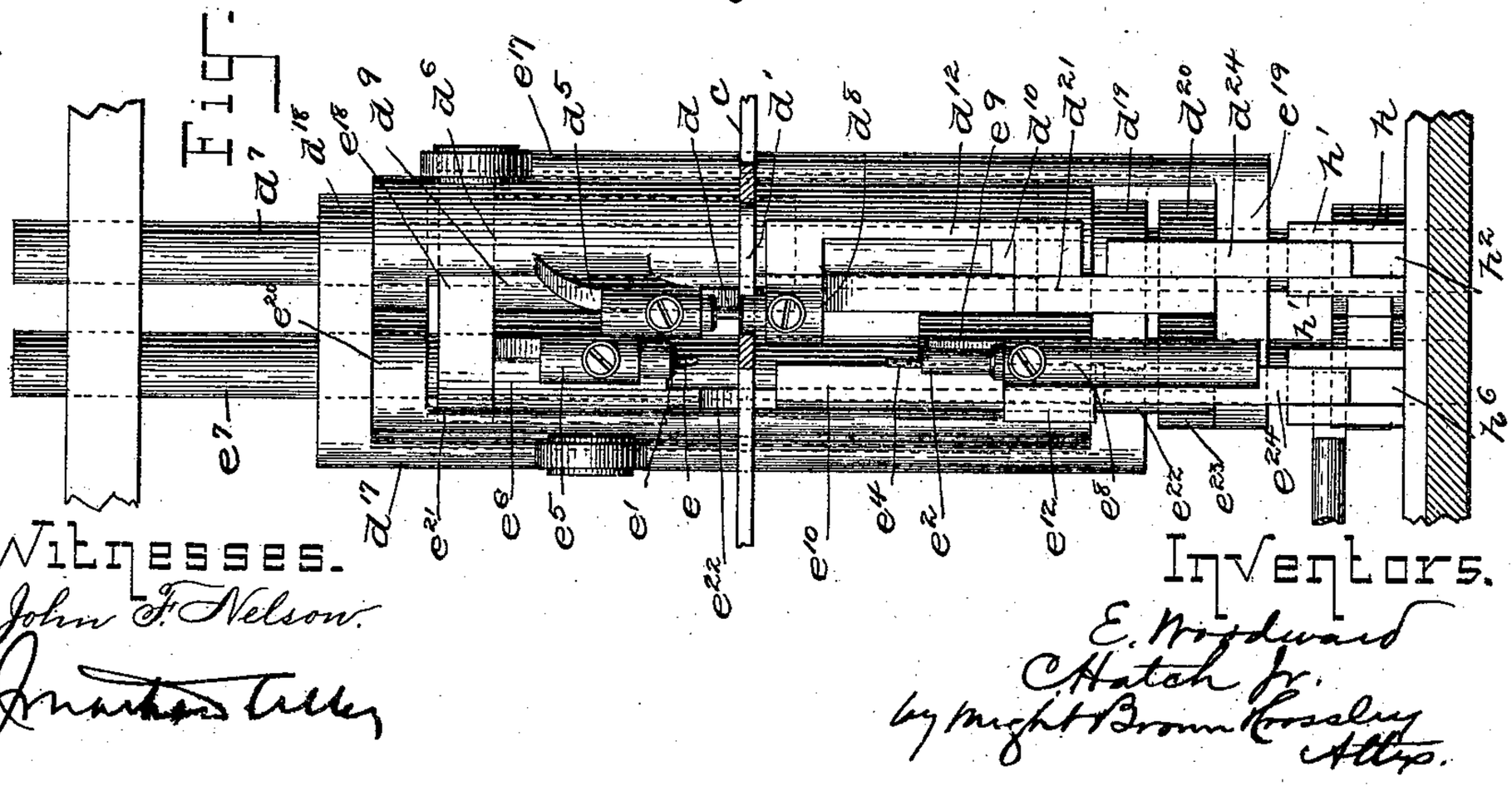


Fig. 3.



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(No Model.) 6 Sheets—Sheet 3.

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EYELETING MACHINE.

No. 501,754. Patented July 18, 1893.

Fig. 4.

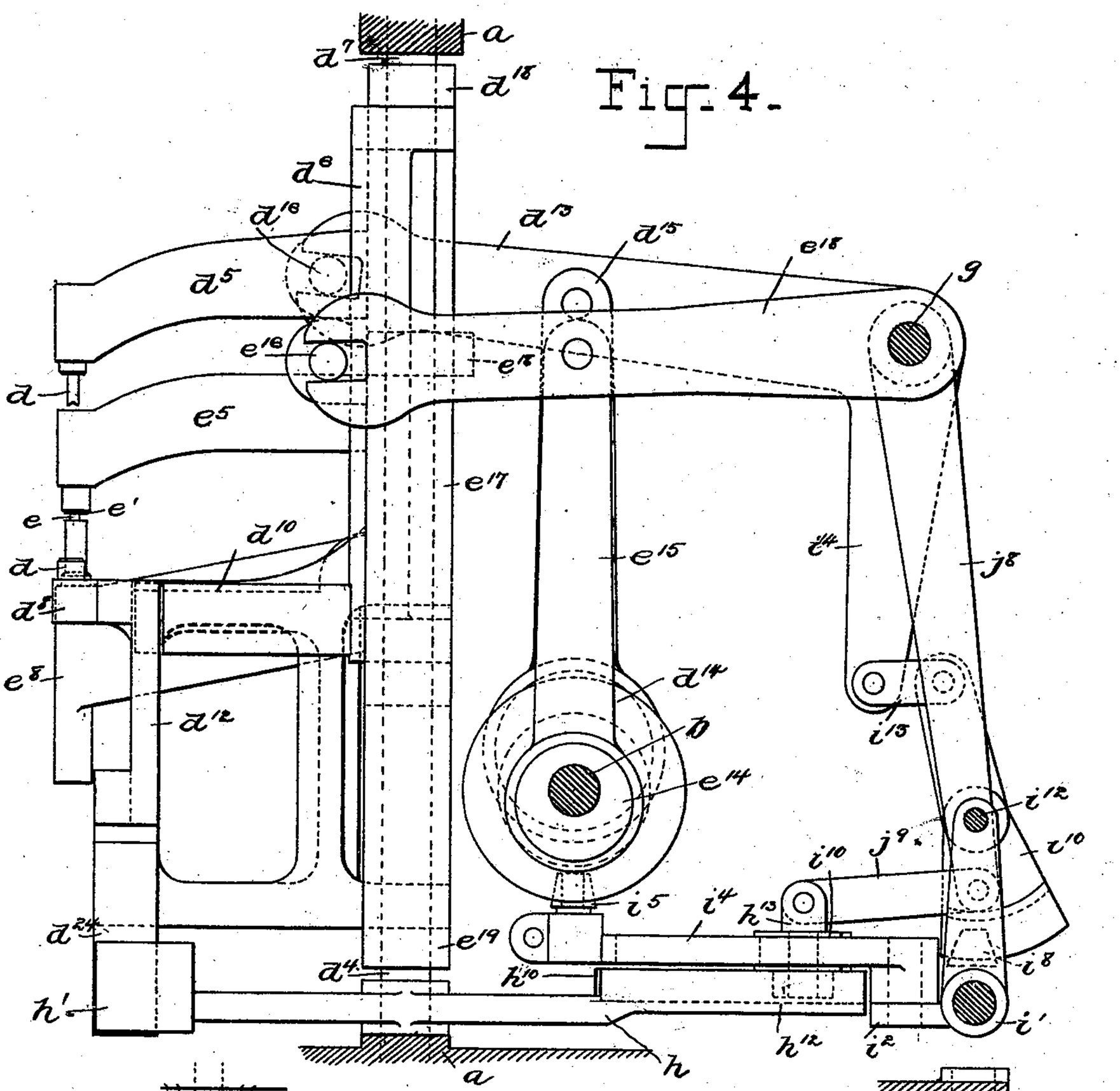
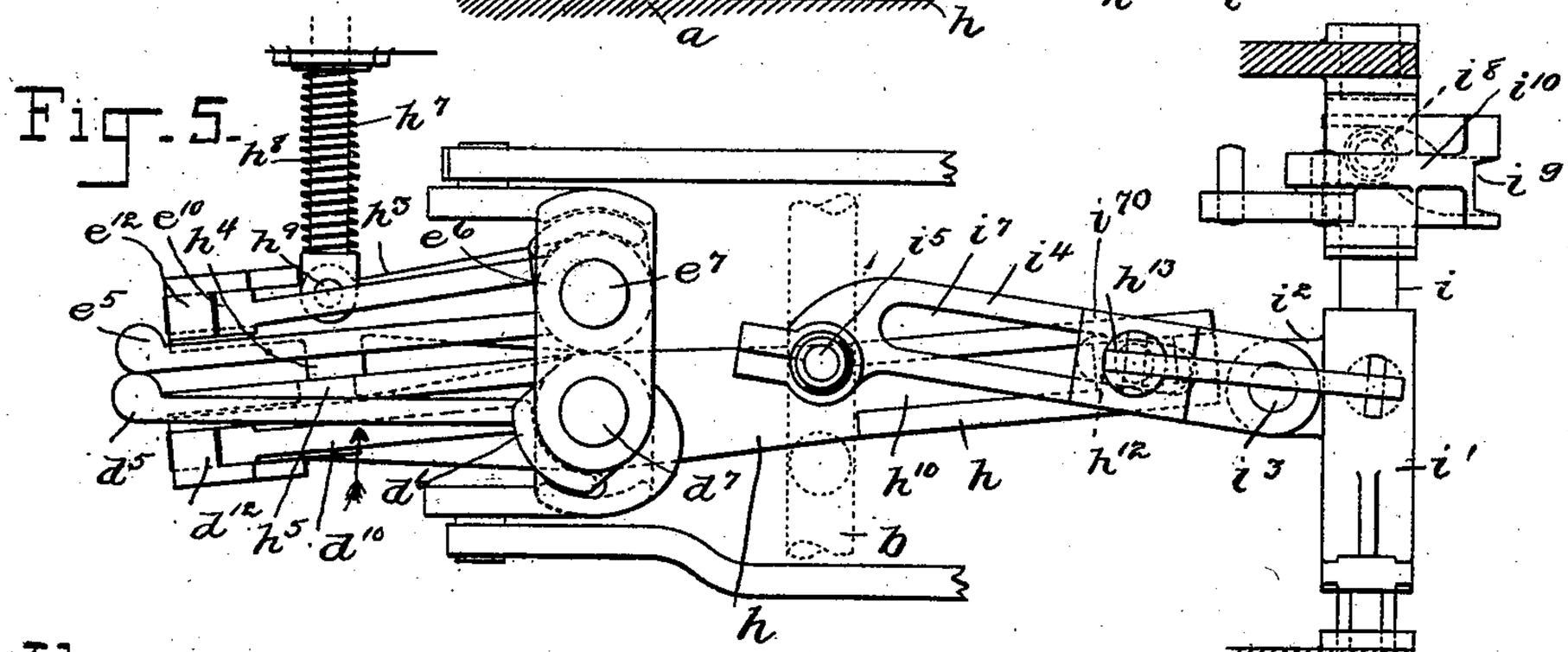


Fig. 5.



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(No Model.) 6 Sheets—Sheet 4.

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EYELETING MACHINE.

No. 501,754. Patented July 18, 1893.

Fig. 6.

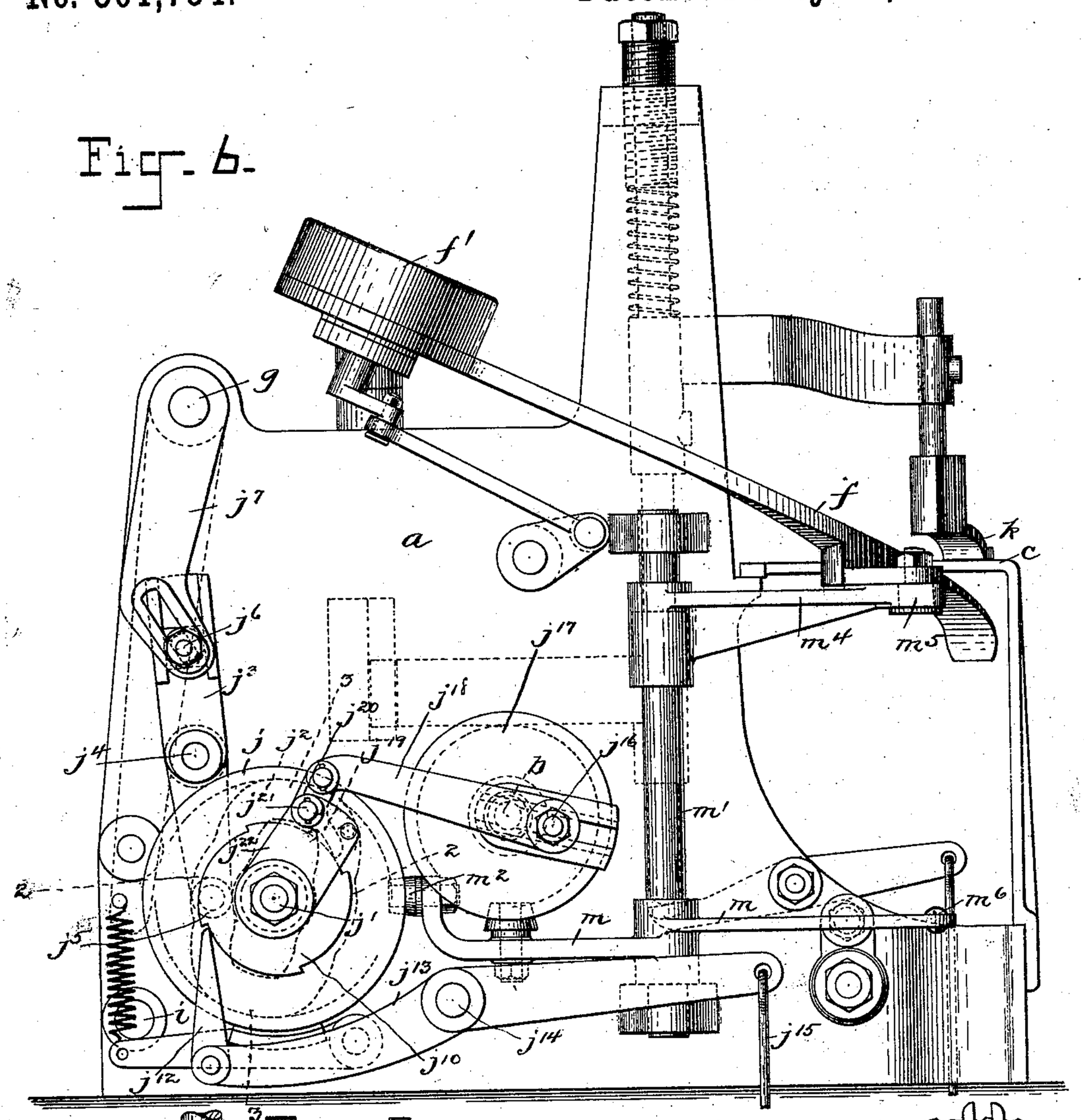
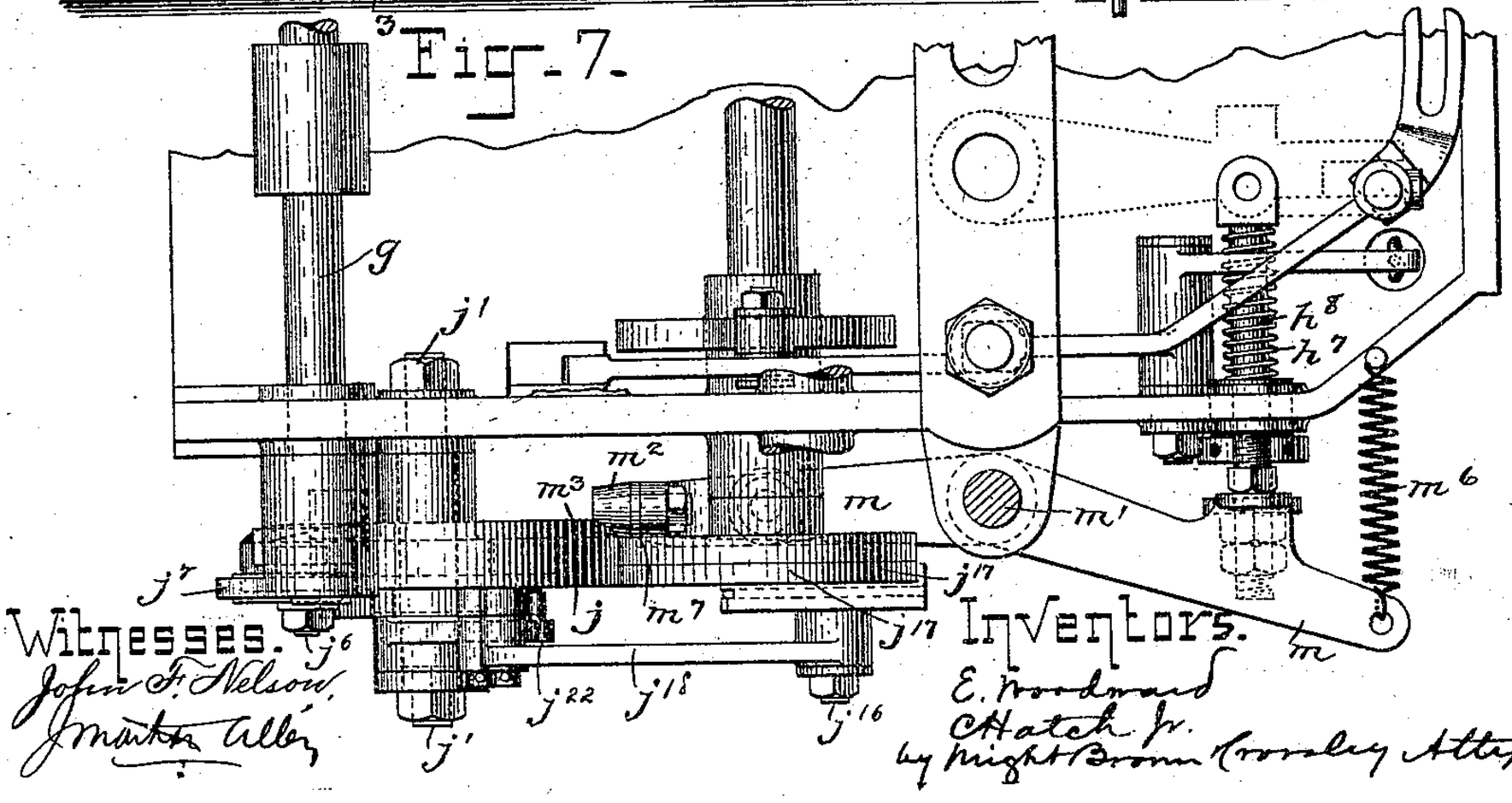


Fig. 7.



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(No Model.)

6 Sheets—Sheet 5.

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EYELETING MACHINE.

No. 501,754. Patented July 18, 1893.

Fig. 9.

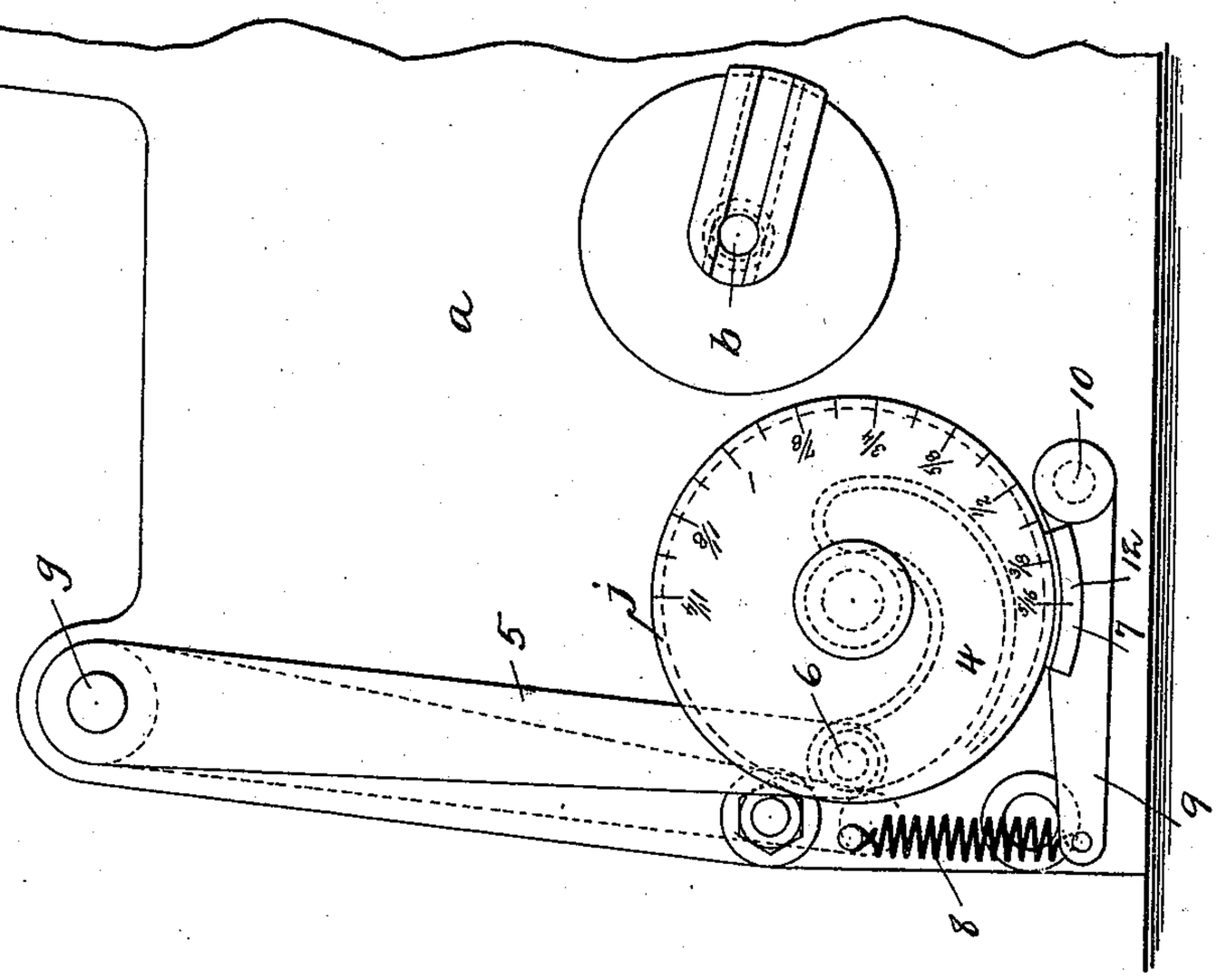
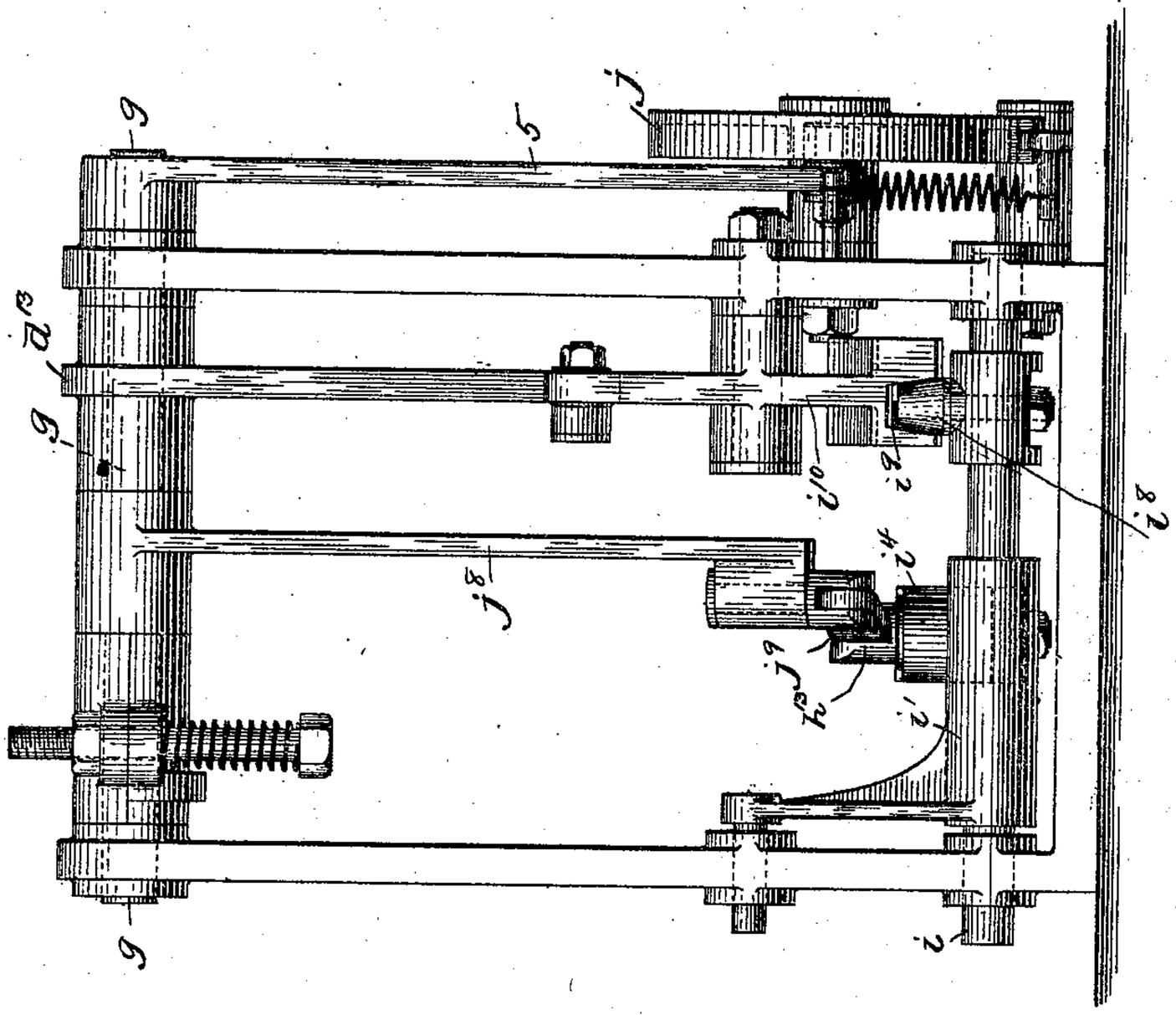


Fig. 8.



Witnesses.
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(No Model.)

6 Sheets—Sheet 6.

E. WOODWARD & C. HATCH, Jr.

EYELETING MACHINE.

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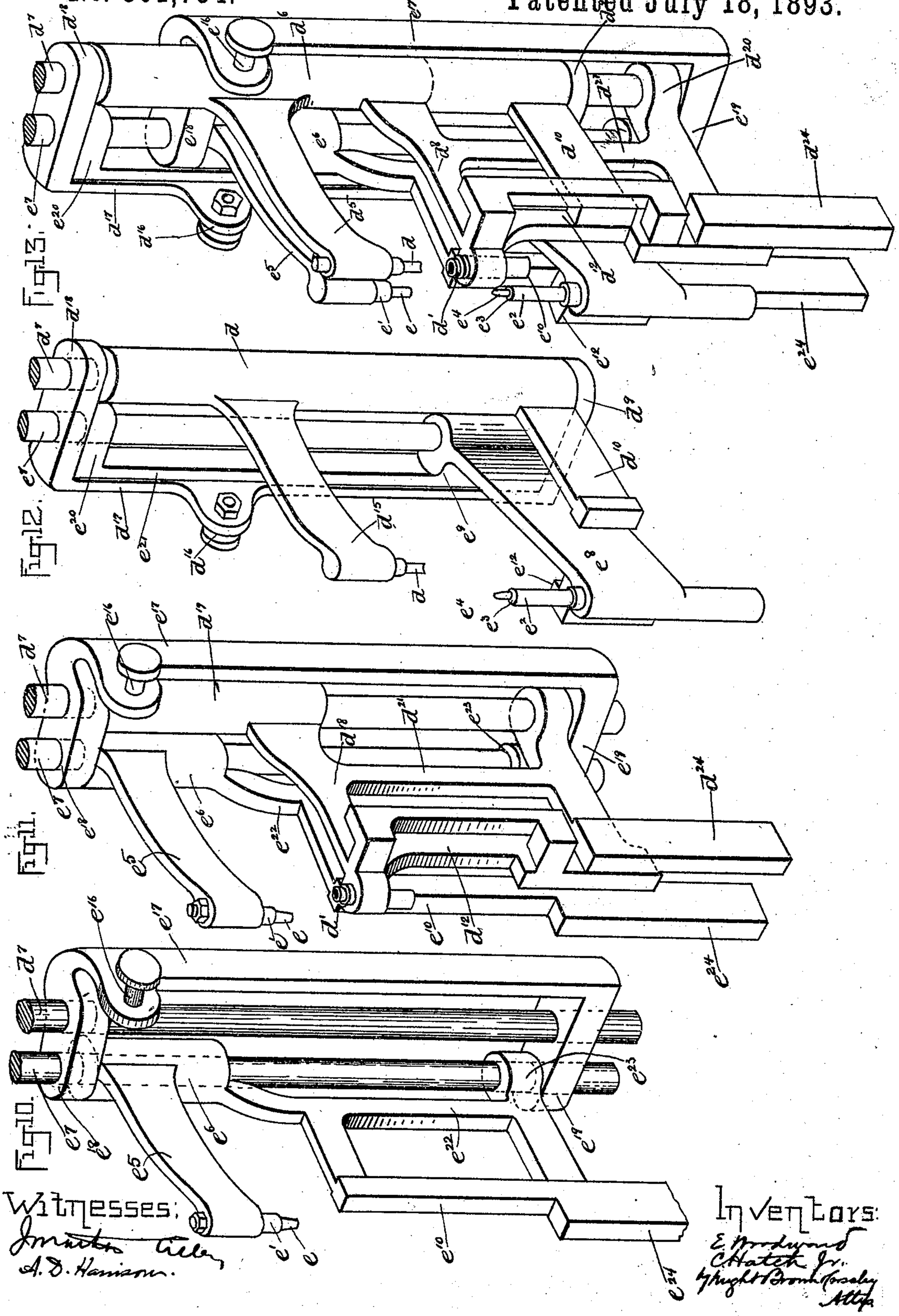

Fig. 12.

Fig. 11.

Fig. 10.

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UNITED STATES PATENT OFFICE.

ERASTUS WOODWARD, OF SOMERVILLE, AND CHARLES HATCH, JR., OF REVERE, ASSIGNORS TO THE MERRICK SEWING MACHINE COMPANY, OF BOSTON, MASSACHUSETTS.

EYELETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 501,754, dated July 18, 1893.

Application filed June 6, 1892. Serial No. 435,678. (No model.)

To all whom it may concern:

Be it known that we, ERASTUS WOODWARD, of Somerville, in the county of Middlesex and CHARLES HATCH, Jr., of Revere, in the county of Suffolk, State of Massachusetts, have invented certain new and useful Improvements in Eyeleting Machines, of which the following is a specification.

This invention relates to eyeleting machines of the type in which the material is punched for the reception of the eyelets, and fed to produce the requisite spaces between the eyelets, the machine being provided with eyelet-inserting and attaching mechanism whereby, after each feeding of the work, an eyelet is inserted in the hole last punched.

The invention has for its object to provide a machine of this class in which the movements of the punch and die that form the eyelet-receiving holes, as well as the movements of the top and bottom sets which insert and secure the eyelets, shall be rectilinear instead of being in the arc of a circle as heretofore, so that the operation of said parts will be more accurate and reliable; secondly, to enable the length of the feed movement of the material and the spacing of the eyelets to be readily and quickly varied, so that the machine may be readily changed from one spacing to another, and thus enabled to alternately attach eyelets and lacing studs, or to attach either eyelets or lacing studs at varying distances apart.

The invention also has for its object to provide improved mechanism for operating the punching and eyelet-setting devices.

To these ends, the invention consists in the several improvements which we will now proceed to describe and claim.

Of the accompanying drawings, forming part of this specification, Figure 1 represents a top view of an eyeleting machine constructed in accordance with our invention. Fig. 2 represents a side elevation of the machine, a part of the supporting-frame being shown in section; and certain parts of the machine, not constituting parts of our invention, being removed for the sake of clearness. Fig. 3 represents a front elevation of that portion of the machine comprising the punching and eyelet-setting devices and the parts that are directly connected therewith. Fig. 4 represents a view similar to Fig. 2, showing a different stage of the operation. Fig. 5 represents a top view of the mechanism shown in Fig. 4. Fig. 6 represents an elevation of the opposite side of the machine from that shown in Fig. 2. Fig. 7 represents a top view of a portion of the machine, the eyelet reservoir and chute being removed. Fig. 8 represents a rear elevation of a portion of the machine, showing different means for changing the length of feed or the spacing of the eyelets. Fig. 9 represents a side elevation of the devices shown in Fig. 8. Figs. 10, 11, 12 and 13 represent perspective views of portions of the machine. Fig. 14 represents an enlarged section on the plane of line 14—14, Fig. 1, showing the punching and eyelet-attaching devices.

The same letters and numerals of reference indicate the same parts in all the figures.

In the drawings: *a* represents the supporting-frame, and *b* the driving-shaft journaled in bearings therein.

c represents the work-supporting bed or table.

d represents the punch, and *d'* the punch block or die which co-operates with the punch in perforating the material.

e represents the top set, which is composed, as usual, of a finger adapted to enter the tube of an eyelet, and surrounded by an annular shoulder *e'*, which upsets and forms the flange upon the end of the tube of the eyelet when said tube is pressed upwardly by the bottom set e^2. Said bottom set is composed of a tube, having its upper end provided with an annular concavity, as shown at e^3 (Fig. 13), to support the flange formed at the lower end of an eyelet.

e^4 represents the finger, which enters the lower eyelet in the eyelet chute *f*, detaches said eyelet from said chute, and causes the engagement of the eyelet with the bottom set. Said finger is adapted to slide in the interior of the bottom set, and is supported by a spring f^5, which permits the finger to yield when the bottom and top sets are brought together, as shown in Fig. 14. The punch *d* is located

over the die d' and in line therewith, and the top set e is located over the bottom set e^2. The punch d and die d' are vertically movable toward and from each other, as are also the top set and bottom set.

The punching and eyelet-setting devices are adapted to move laterally, the arrangement being such that, after the work on the table c has been punched, the punch is moved laterally while in the work, and thus caused to feed the latter, the punch emerging from the work and leaving the punched hole in position to receive the eyelet, which is inserted and attached by the conjoint operation of the top and bottom sets.

As shown in Figs. 12 and 13 the punch d is affixed to an arm d^5, which is formed on and projects from a carrier d^6, which is fitted to slide vertically on a fixed guide-rod d^7, the ends of which are suitably supported in sockets on the frame a. The punch-carrier d^6 is adapted both to slide vertically and to oscillate horizontally upon the guide-rod d^7, and mechanism is provided for giving said carrier the described movements, and thus causing both the vertical and lateral movements of the punch, which cause it to perforate and feed the work.

The top set e and its shoulder e' are affixed to an arm e^5, which is formed on and projects from a carrier e^6, adapted to move vertically and swing horizontally upon a guide-rod e^7, which is located beside the guide-rod d^7, the top set being given its lateral and vertical movements by the described movements of the carrier e^6.

The punch die d' is affixed to an arm d^8, which is formed on a carrier d^9, which is fitted to slide vertically and oscillate horizontally on the guide-rod d^7, the die-carrier d^9 being adapted to move vertically independently of the punch-carrier d^6. The two carriers are engaged, however, so that they swing horizontally in unison, by means of an arm d^{10}, affixed to the punch-carrier, and engaged at its outer end with a vertical guide d^{12}, affixed to the arm d^8, the engagement of the arm d^{10} with the guide d^{12} being such that the punch-carrier and the die-carrier can move vertically, each independently of the other, but are caused to move horizontally in unison.

The bottom set is affixed to an arm e^8, which is formed on a bottom set carrier e^9, which is fitted to slide vertically and swing horizontally upon the guide-rod e^7. The top and bottom set carriers are adapted to move independently of each other, in a vertical direction, on said guide-rod; and are connected so that they necessarily swing horizontally in unison, by means of a guide-bar e^{10}, affixed to the top set carrier e^6, and engaged with a grooved lug or ear e^{12}, affixed to the bottom set arm e^8, this engagement enabling the top and bottom sets to move vertically independently of each other, and requiring them to move horizontally in unison.

It will be seen from the foregoing that the punch and die and the top and bottom sets, in co-operating with each other, move rectilinearly in consequence of their being mounted on carriers which move on fixed guide-rods. Hence there is no swinging movement of either of said parts when it is approaching the co-operating part, and the two parts or members of each organization,—namely, the punching and the eyelet-setting organizations,—are positively guided and caused to co-operate with the utmost exactness.

We employ a mechanism for imparting the necessary vertical movements to the punching and setting devices, and another mechanism for imparting the horizontal swinging motions to said devices, and these mechanisms we will now describe, beginning with the mechanism for moving the punching and setting devices vertically.

g represents a stud, which is affixed to the supporting-frame. On said stud are mounted to oscillate two levers, d^{13} e^{13}. These levers are oscillated vertically by means of eccentrics d^{14} e^{14}, on the driving-shaft b, and connecting-rods d^{15} e^{15}, which respectively connect the eccentrics d^{14} e^{14} with the levers d^{13} e^{13}. The swinging end of the lever d^{13} is engaged by means of a stud d^{16} with an ear on a yoke or frame d^{17}, which is provided at its upper and lower ends with lugs d^{18} d^{19}, fitted to slide upon the guide-rods d^7 e^7. The lug d^{18} bears upon the upper end of the punch-carrier d^6, and the lug d^{19} upon the lower end of said carrier; hence the vertical movements of the yoke d^{17} cause corresponding movements of the punch-carrier and punch. The bottom set carrier e^9 bears upon the lower lug d^{19}, and is provided with an upwardly-projecting extension e^{21}, terminating in an ear or lug e^{20}, which is fitted to slide upon the guide-rod e^7, and bears upon the lug d^{18}. Hence the bottom set rises and falls in unison with the punch, the bottom set carrier and punch-carrier being similarly engaged with the yoke d^{17}, and reciprocated vertically thereby, the punch and bottom set having no vertical movement independently of each other.

The outer end of the lever e^{13} is engaged by means of a stud e^{16} with an ear on a yoke e^{17}, provided at its ends with lugs e^{18} e^{19}, which lugs are fitted to slide on the guide-rods d^7 e^7, the lugs e^{18} e^{19} being located below the lugs d^{18} d^{19}, as shown in Figs. 3 and 13. The lug e^{18} bears on the upper end of the top set carrier e^6, and said carrier is provided with a downwardly-projecting extension e^{22} (Fig. 10), terminating at its lower end in an ear or lug e^{23}, bearing upon the lower lug e^{19} of the yoke e^{17}. The punch die carrier d^9 is provided with a downwardly-projecting extension d^{21} (Fig. 11), having at its lower end an ear d^{20}, fitted to slide upon the guide-rod d^7, and bearing on the lower lug e^{19} of the yoke e^{17}. It will be seen, therefore, that both the top set carrier and the punch die carrier are engaged with the top and bottom lugs of

the yoke e^{17}, so that they will be reciprocated vertically together, by movements of said yoke, the said punch die and top set moving vertically in unison, and having no vertical movement independently of each other.

We will now describe the mechanism for moving the punching and setting devices horizontally.

h represents a horizontal lever, which is fitted to oscillate upon the guide-rod d^7, and is oscillated horizontally by means presently described. The forward end of the lever h is provided with a vertical slot or guide h^2, formed between plates or ears h' h', affixed to said lever (Fig. 3). Said guide is engaged with an arm d^{24}, affixed to and projecting downwardly from the punch die carrier d^9, said arm d^{24} being adapted to slide vertically while engaged with the lever h, so that the horizontal movements of said lever impart similar movements through the arm d^{24} to the punch die carrier, and through the arm d^{10}, having the described sliding connection with the punch die carrier, to the punch-carrier d^6. Hence the punch die and the punch, while movable vertically independently of each other, are caused to move horizontally in unison.

h^3 (Figs. 1 and 5) represents a lever, which is fitted to oscillate horizontally upon the guide-rod e^7, and is located beside the lever h, its swinging end being in close proximity to the end of the lever h that is engaged with the punch die carrier. The lever h^3 has a lug or projection h^4 (Fig. 5), which is arranged to strike a similar projection h^5 on the lever h, the arrangement being such that, when the lever h is moved in the direction indicated by the arrow in Fig. 5, its projection h^5 will strike the projection h^4 and move the lever h in the same direction. The lever h is provided at its forward end with a vertical guide h^6 (Fig. 3), which receives an arm e^{24}, projecting downwardly from the top set carrier e^6. It will be seen, therefore, that the movement of the lever h^3, as indicated, will cause a corresponding movement of the bottom set, and, through the described engagement of the bottom set carrier with the top set carrier, a similar movement of the top set. A spring h^7, supported by a rod h^8, pivoted at h^9 to the lever h^3, presses the lever h^3 in the opposite direction, and causes it to follow the lever h when the latter is moved in the direction opposite that indicated by the arrow in Fig. 5, the rod h^8 being adapted to slide in a guide in the supporting-frame.

The mechanism that oscillates the lever h to give the punching and feeding devices their lateral movements is as follows: i represents a horizontal rod, adapted to slide in guides in the supporting-frame. To said rod is affixed a collar i', having an ear i^2, to which is pivoted at i^3 a link or arm i^4. The link i^4 has on its outer end a trundle-roll i^5, which engages a cam i^6 (Figs. 1 and 4) on the shaft b. Said cam is formed to oscillate the link i^4 horizontally on its pivot i^3. The lever h is provided with a slot or way h^{10} (Figs. 4 and 5), which receives a slide h^{12}, from which projects upwardly a stud h^{13}, passing through a slide i^{70} in a slot i^7 in the link i^4. The stud h^{13} constitutes an adjustable pivot, connecting the link i^4 with the lever h, and enabling the oscillating movements of said link to impart oscillating movements to the lever h, the extent of which is determined by the position of the stud h^{13}, said stud being movable toward and away from the pivot i^3, on which the link i^4 oscillates. We have provided means whereby the operator may readily move the stud h^{13} back and forth between two positions, in one of which the stud is at its minimum distance from the pivot i^3 and gives the lever h and the punching and eyelet-setting devices a minimum movement for short spacing, while in the other position the stud h^{13} is at its maximum distance from the pivot i^3 and gives the lever h and the punching and eyelet-setting devices their maximum movement for long spacing.

We have here shown, as the means for changing the position of the stud h^{13}, the following mechanism:

j (Fig. 6) represents a disk, which is mounted to rotate upon a stud j', affixed to one side of the supporting-frame, and provided on its inner side with a cam-groove j^2, shown in dotted lines in Fig. 6.

j^3 represents a lever, pivoted at j^4 to the supporting-frame, and having at one end a trundle-roll j^5, engaging the cam-groove j^2. Near the other end of the lever j^3 is an adjustable stud j^6, engaged with said lever, and adjustable lengthwise thereof. The stud j^6 connects the lever j^3 to an arm j^7, affixed to the rock-shaft g hereinbefore referred to. To said rock-shaft g is affixed an arm j^8, the lower end of which is connected by a link j^9 with the stud h^{13}. To the disk j, having the cam-groove j^2, is affixed a ratchet-wheel j^{10}, having, in this instance, four (4) teeth, of equal length.

j^{12} represents a pawl, pivoted to a lever j^{13}, which is pivoted at j^{14} to the supporting-frame, and has one end connected by a rod j^{15} with a treadle (not shown) under the machine. When the treadle and the rod j^{15} are depressed by the operator, the pawl j^{12} is thrown upwardly, and caused to give the ratchet j^{10} and disk j a partial rotation. The cam-groove j^2 is composed of two dead or concentric portions 2 2 of short radius, and two dead or concentric portions 3 3 of longer radius, the intermediate portions of the groove being eccentric or cam-shaped, all as shown by dotted lines in Fig. 6.

j^{16} represents a stud or wrist-pin, adjustably secured to a disk j^{17}, affixed to the driving-shaft b.

j^{18} represents a link, connecting the stud or wrist-pin j^{16} with a pawl j^{19}, having an arm j^{20}, which is pivoted to the link j^{18}, the pawl being pivoted at j^{21} to an arm j^{22}, adapted to oscillate loosely on the stud j'. The pawl j^{19} is

arranged to engage the teeth of the ratchet j^{10}, and give said ratchet and the disk j a partial rotation, when said pawl, in moving forward, engages a tooth of said ratchet, the pawl being regularly reciprocated by the rotation of the shaft b through the wrist-pin j^{16} and link j^{18}. The arrangement is such that, when the lever j^{13} is operated by the treadle, the pawl j^{12} will give the ratchet and the disk j a movement sufficient to bring one tooth of the ratchet j^{10} into the path of movement of the pawl j^{19}, so that said pawl, in moving forward, will give the ratchet j^{10} and disk j an additional movement, the two movements,—namely, that given by the pawl j^{12}, and that given by the pawl j^{19},—being sufficient to move one of the dead portions of the cam-groove j^2 away from the trundle-roll j^5, and the succeeding dead portion into engagement with said trundle-roll, so that, upon each movement of the lever j^{13}, the trundle-roll will be moved toward or from the axis of the disk j, as the case may be, the trundle-roll being moved away from said axis when the disk j is being moved from the position shown in Fig. 6, said movement carrying the trundle-roll from one of the inner dead portions 2 to the succeeding outer dead portion 3. After the pawl j^{12} has partially rotated the disk j, it is thrown out of engagement with the ratchet, and retracted by a suitable spring; and, after the pawl j^{19} has completed the movement of the disk j, there will be no further movement of said disk until the lever j^{13} is again operated by the treadle. The change of position of the disk j last described causes the intermediate devices to move the stud h^{13} to its outer position, and thus give the punching and eyelet-setting devices their maximum horizontal movement. The next operation of the lever j^{13} will partially rotate the disk j and cause the pawl j^{19} to give the same another partial rotation, and thus move the cam groove, so that the trundle-roll will pass from one of the outer dead portions 3 to the succeeding inner dead portion 2, thus moving the stud h^{13} to its minimum throw position, and causing it to give the punching and eyelet-setting devices their minimum horizontal movement. It will be seen, therefore, that the operator, by simply depressing the treadle, causes the power of the machine to change the spacing or feed of the material from long to short, or from short to long.

To provide for an additional horizontal movement of the punching and eyelet-setting devices, in addition to that provided for by the mechanism above described, we give the ear i^2, to which the link i^4 is pivoted, a horizontal reciprocating motion, which takes place while the punch and top set are raised and the punch die and bottom set are depressed, and therefore while said parts are separated from the work, the object of this additional movement being to enable the spacing to be made as short as may be desired, without cutting away the adjacent surfaces of the arms that carry the punching and eyelet-setting devices; or, in other words, to make the spaces between the eyelets shorter than the actual space between the punch and top set and punch die and bottom set, when said parts are at their closest approach.

Means for effecting the lateral movement of the ear i^2, as here shown, are as follows: Said ear, as already stated, is affixed to the sleeve i', which in turn is affixed to the stud i, which is adapted to slide lengthwise in guides formed in the supporting-frame. The stud i is provided on its upper side with a trundle-roll i^8 (Figs. 4, 5 and 8), which engages a cam-groove i^9, formed in one arm of a lever i^{10}, which is pivoted at i^{12} to the supporting-frame. The other arm of said lever is connected by a link i^{13} with an arm i^{14}, affixed to the lever d^{13} above described. The oscillating movements of the lever d^{13} are imparted through the arm i^{14}, link i^{13} and lever i^{10} to the cam-groove i^9, which is formed to impart a reciprocating motion to the stud i, ear i^2 and the pivot or fulcrum i^3, said mechanism being timed to give the pivot i^3 a short lateral or horizontal movement, and thus give the punching and eyelet-setting devices additional horizontal movements when they are being moved horizontally by the mechanism above described. It will be seen that this additional lateral movement, taking place while the punch and top set are raised, enables the top set to retreat before the punch when the latter is moving, preparatory to punching and feeding the work, so that, after an eyelet has been inserted and the top and bottom sets have separated, the punch is enabled to move as far as may be desired toward the last hole before it punches the work, the top set retreating before the punch. Hence the holes can be made as close together as may be desired, without regard to the thickness of the arms which respectively carry the punch and top set and the punch die and bottom set.

In Figs. 8 and 9, we show a modification of the mechanism for changing the position of of the stud h^{13} and varying the length of the spacing. In said modification, the disk j has a cam-groove 4, formed as shown by dotted lines in Fig. 9, and the rock-shaft g has a single arm 5, having a trundle-roll 6 engaged with the cam-groove 4. The disk j, in this case, is rotated by the hand of the operator, and is provided with a brake 7, held against its periphery by means of a spring 8, to prevent loose rotation of the disk, and retain it in any position to which it may be adjusted, the brake being a shoe, formed on a lever 9, pivoted at 10 to the supporting-frame. The form of the cam-groove 4 is such as to give the stud h^{13}, through the arm 5, rock-shaft g and the devices already described connecting said rock-shaft to the stud h^{13}, a series of positions; or, in other words, any position between that caused by the engagement of the trundle-roll 6 with the inner end of the cam-groove, to that caused by the engagement of

said trundle-roll with the outer end of the cam-groove. The disk is provided with marks or gradations on its outer side, as shown in Fig. 9, said marks registering successively with a mark 12 on the brake 7, and indicating the length of the spaces which would be produced by any given adjustment of the disk *j*. The operator is thus enabled to effect more than two variations of the spacing, as will be readily seen.

The machine is provided with a presser-foot *k*, and suitable means for raising and lowering the same, both automatically and by the act of the operator; but, as the presser-foot mechanism employed by us involves nothing new, we do not deem it necessary to describe the same.

The eyelet chute *f* is or may be oscillated laterally by means of a lever *m*, affixed to a vertical shaft *m'*, which is journaled in bearings on the supporting-frame; a trundle-roll m^2, on one end of said lever, engaged with a cam m^3 (Fig. 7) on the disk *j;* an arm m^4, on the shaft *m'*, pivotally connected at m^5 with the lower portion of the eyelet chute; and a spring m^6 connected at one end with the frame of the machine, and at the other end with one arm of the lever *m*, said spring acting to hold the trundle-roll m^2 against the cam m^3. The eyelet chute is mounted to oscillate upon a pivot *f'* (Fig. 1), and is provided at its upper end with the usual eyelet reservoir f^2, containing a suitable agitator, which supplies the eyelets to the chute. When the disk *j* is adjusted to give the punching and setting mechanisms their minimum lateral movement, the cam m^3 is out of contact with the trundle-roll m^2, and therefore does not act on the lever *m*. Under these circumstance, the lever *m* is oscillated at regular intervals, by means of a cam m^7 on the disk j^{17}, said disk being continuously rotated by the driving-shaft *b*, the spring m^6 holding the trundle-roll m^2 against the cam m^3. The oscillating movements imparted to the eyelet chute by the cam m^7 and spring m^6 cause the lower end of the eyelet chute to stand in the path of the bottom set when the latter is rising, and until the bottom set has engaged the lower eyelet in the chute, the chute being then moved laterally out of the way of the bottom set, as usual in eyeleting machines of this class. When the disk *j* is adjusted to give the punching and eyelet-setting devices their maximum throw, the cam m^3 is brought to bear upon the trundle-roll m^2, and moves the lever *m* in such manner as to displace the lower end of the eyelet chute from its operative position, and prevent the supply of eyelets to the bottom set so long as the last mentioned adjustment continues. It will be seen, therefore, that the supply of eyelets is automatically stopped whenever the lateral throw of the punching and eyelet-setting devices is increased. The object of preventing the supply of eyelets, as last described, is to enable holes to be punched and the work to be fed without inserting anything in the holes, the holes being subsequently supplied with lacing hooks, by other means. Heretofore, in machines in which the spacing is variable, the supply of eyelets has been prevented by means which are dependent for their operation upon the act of the operator. Hence there has always been liability of supplying eyelets to the holes intended to receive lacing studs, through carelessness of the operator. It will be seen that, by automatically preventing the supply of eyelets, as described, the liability of inserting eyelets in the holes intended for lacing studs is prevented.

The operation of the machine is as follows: When the punch *d* descends to penetrate the work, the punch die *d'* rises, to co-operate therewith, as shown in Fig. 3, the top and bottom sets being at the same time separated. After the punch enters the work, it moves laterally toward the left, as viewed in Fig. 3, thus feeding the work the required distance, which is determined by the adjustment of the stud h^{13}. The punch and die then separate, and at the same time the punch and die and top and bottom sets are moved laterally toward the right as viewed in Fig. 3, until the top and bottom sets are in line with the punched hole. The lateral motion then ceases, and the bottom set raises its finger, picking an eyelet from the lower end of the chute, and carrying the eyelet up into the work, and co-operating with the top set in upsetting and attaching the eyelet. The top and bottom sets then separate, and the punch and die are moved laterally toward the left, the top and bottom sets retreating at the same time, until the punch reaches the desired position to form the next hole, when it descends and forms another hole, and so on, the operation being repeated indefinitely. It will be seen that the pair of devices which punch the material,—namely, the punch and die,—are supported by a pair of carriers, each movable vertically independently of the other to permit the punch and die to alternately approach and recede from each other, and each having a sliding connection with the other, so that the punch and die are always kept in alignment, and are caused to move laterally in unison. The same statement is true of the pair of setting devices comprising the top set and the bottom set, these devices being supported by a pair of carriers, which are movable vertically independently of each other, and are connected by a sliding connection, so that the setting devices are always kept in alignment with each other and caused to move laterally in unison. This sliding connection between the carriers of each pair is a very important feature of our invention, since it entirely precludes the possibility of the punch and die and the top and bottom sets being thrown out of alignment with each other by carelessness of the operator in adjusting the machine.

We do not limit ourselves to the details of

mechanism hereinbefore described, and may secure the more important results which we have mentioned, by any other suitable mechanical contrivances, said results being the keeping of the carriers of each pair in alignment with each other, the changing of the lateral movement of the punching and setting devices, the automatic displacement of the eyelet chute from its operative position when the lateral movement of the punching and setting devices is increased, and the regular lateral movements of the punching and setting devices to permit the punch to get out of the way of the top set after punching a hole in the material. The mechanism for reciprocating the carriers vertically and horizontally may be variously modified.

It will be seen that the disk j, the ratchet j^{10}, the pawl j^{19} which is continuously oscillated by the power of the machine, and the connections between the cam-groove in said disk and the adjusting stud h^{13}, constitute a normally inoperative mechanism for moving the stud h^{13} from either of its operative positions to the other by the power of the machine, said mechanism being made operative by devices controlled by the operator, and comprising, in this case, the lever j^{13}, and the pawl j^{12} adapted to be moved by said lever to give the ratchet j^{10} a partial movement, and put it into position to be additionally operated by the pawl j^{19}. It will be further observed that the movement of the disk j, which carries the trundle-roll j^5, from one concentric portion of the cam-groove j^2 to another, through the intermediate eccentric portion, is effected by the power of the machine and that the movement of the disk j which is effected by the operator through the lever j^{13} is accomplished entirely while the trundle-roll j^{12} is engaged with one of the dead or concentric portions of the cam-groove, and prepares the succeeding eccentric portion of the cam-groove to act on the trundle-roll. Hence all the movements of the disk j that require considerable application of power are effected by the power of the machine, and no change in the length of spacing is possible until the operator prepares for said change by giving the disk j a partial rotation.

We claim—

1. In an eyeleting machine, the combination of punching and eyelet-setting devices arranged in pairs, one pair comprising a punch and a die and the other a top set and a bottom set, a series of carriers to which said devices are secured, two yokes one engaged with the punch-carrier and with the bottom set carrier and the other with the punch die carrier and top set carrier, two fixed guide-rods on which said yokes are fitted to slide vertically, the carriers on one yoke being fitted to swing laterally on one rod while the carriers on the other yoke are fitted to swing laterally on the other rod, sliding connections between each carrier on one yoke and the corresponding carrier on the other yoke, mechanism for reciprocating the yokes on the guide-rods, and mechanism for swinging the carriers on the guide-rods, as set forth.

2. In an eyeleting machine, the combination of a pair of punching devices comprising a punch and a die, a pair of setting devices comprising a top set and a bottom set, a series of carriers supporting said devices and adapted to swing laterally, mechanism for reciprocating said carriers vertically to cause the devices of each pair to alternately approach and recede from each other, mechanism including two levers and an adjustable stud or pivot connecting said levers whereby said carriers are moved laterally, and means for adjusting said stud to vary the extent of the lateral movement of the carriers, as set forth.

3. In an eyeleting machine, the combination of a pair of punching devices comprising a punch and a die, a pair of setting devices comprising a top set and a bottom set, a series of carriers supporting said devices and adapted to swing laterally, mechanism for reciprocating said carriers vertically to cause the devices of each pair to alternately approach and recede from each other, mechanism including two levers and an adjustable stud or pivot connecting said levers, whereby said carriers are moved laterally, a rotary cam mounted on the frame of the machine, devices controlled by the operator for giving said cam a step by step rotation, and connections between said cam and the adjustable stud, whereby each change of position of the cam is caused to change the position of the stud and vary the extent of the lateral movement of the carriers, as set forth.

4. In an eyeleting machine, the combination of a pair of punching devices comprising a punch and a die, a pair of eyelet-setting devices comprising a top set and a bottom set, a pair of carriers holding the punching devices, another pair of carriers holding the setting devices, mechanism for reciprocating said carriers vertically to cause the devices of each pair to alternately approach and recede from each other, mechanism including a lever pivoted to a horizontally movable support whereby said carriers are moved laterally, and mechanism for reciprocating said support and thus causing the punch to retreat from the position it occupied when punching the work, whereby the top set is permitted to enter the punched hole without being obstructed by the punch-carrier, as set forth.

5. In an eyeleting machine, the combination of a pair of punching devices, a pair of eyelet-setting devices, two pairs of carriers supporting said devices and adapted to swing laterally, mechanism for reciprocating said carriers vertically, adjustable mechanism whereby the carriers may be given a longer or a shorter lateral movement, an eyelet chute adapted to supply eyelets to the setting devices, and mechanism substantially as de-

scribed whereby the eyelet chute is automatically displaced from its operative position when the lateral movement of the carriers is lengthened as set forth.

6. In an eyeleting machine, the combination of a pair of punching devices, a pair of eyelet-setting devices, two pairs of carriers supporting said devices and adapted to swing laterally, mechanism for reciprocating said carriers vertically to cause the devices of each pair to alternately approach and recede from each other, mechanism including two levers and an adjustable connecting stud or pivot, whereby the carriers are moved laterally, a laterally movable eyelet chute adapted to supply eyelets to the setting devices, mechanism substantially as described for adjusting the position of said stud to vary the lateral movement of the punching and setting devices, and mechanism substantially as described for displacing the eyelet chute from its operative position when the lateral movement of the punching and setting devices is increased, as set forth.

7. In an eyeleting machine, the combination of a pair of punching devices, a pair of eyelet-setting devices, two pairs of carriers supporting said devices and adapted to swing laterally, mechanism for reciprocating said carriers vertically, adjustable mechanism whereby the carriers may be moved back and forth laterally, said mechanism including an adjusting device whereby the lateral movement of the carriers may be made longer or shorter, normally inoperative mechanism substantially as described for moving said adjusting device from either of its operative positions to the other by the power of the machine, and devices substantially as described controlled by the operator whereby said normally inoperative mechanism may be made operative to change the length of said lateral movement, the said mechanism being organized to become inoperative after effecting each change, as set forth.

8. In an eyeleting machine, the combination of a pair of punching devices, a pair of eyelet-setting devices, two pairs of carriers supporting said devices and adapted to swing laterally, mechanism for reciprocating said carriers vertically, adjustable mechanism whereby the carriers may be moved back and forth laterally, said mechanism including an adjusting device whereby the lateral movement of the carriers may be made longer or shorter, normally inoperative mechanism for moving said adjusting device from either of its operative positions to the other by the power of the machine, a laterally movable eyelet chute arranged to supply eyelets to the setting devices, connections between said normally inoperative mechanism and the eyelet chute, whereby the chute is moved from its operative position when the length of the lateral movement of the punching and setting devices is increased, and devices controlled by the operator whereby said normally inoperative mechanism may be made operative to change the length of the said lateral movement, the said mechanism being organized to become inoperative after effecting each change, as set forth.

9. In an eyeleting machine, the combination of a pair of punching devices, a pair of eyelet-setting devices, two pairs of carriers supporting said devices and adapted to swing laterally, mechanism for reciprocating said carriers vertically, adjustable mechanism whereby the carriers may be given a longer or a shorter lateral movement, said adjustable mechanism including an adjustable stud which determines the extent of said lateral movement, a laterally movable eyelet chute arranged to supply eyelets to the setting devices, a rotary disk having a cam-groove such as j^2 and a cam such as m^3, connections between said cam-groove and the movement-controlling stud whereby said stud is moved by changes in the position of the disk, connections between the cam m^3 and the eyelet chute whereby the chute is displaced when the disk is moved to position to increase the lateral movement of the punching and setting devices, an operating device such as the pawl j^{19} operated by the power of the machine and adapted to give said disk a partial rotation, and a device controlled by the operator for giving said disk a preliminary partial rotation and thereby enabling said operating device to give the disk its space-changing movement, as set forth.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 27th day of May, A. D. 1892.

ERASTUS WOODWARD.
CHARLES HATCH, JR.

Witnesses:
C. F. BROWN,
A. D. HARRISON.